AN OVERVIEW OF MATERNAL DEPRESSION, INFANT REACTIONS AND INTERVENTION PROGRAMMES

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Summary

Studies on high risk motherhood and its effects on mother-infant interactions have focused on depression as one potential factor placing infants at risk of less than optimal socioemotional development. Effects of maternal depression on infant psychological development have been widely documented. Compared with controls, infants of depressed mothers manifest disturbances in their ability to regulate emotion, impairments in their capacity to engage objects and people and to react adequately to social stimulation. These infants also show cognitive problems during development and insecure attachment behavior to mothers at one-year-old. In this article first of all features of maternal depression, its prevalence during pregnancy and post-partum and assessment difficulties will be investigated. Secondly, on the basis of the most recent research, maternal depression effects on child development will be discussed, highlighting how crucial the caregiver quality and the process of affect regulation are for understanding intergenerational transmission of depression. Starting from these considerations then preventive interventions based on home visiting technique, mainly aimed to reduce depression negative impact on child psychological development, will be shown.

Key Words: Maternal depression – Preventive intervention – Home visiting

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Some problems in defining and assessing "maternal depression"

Depression represents a quite complex condition whose interest is mainly sustained by its high presence within female population which ranges from 10 to 20% according to the method used in order to detect it (Kessler et al. 1994, Gotlib et al. 1995). Women are regarded particularly at risk of developing depression for a complex set of social, psychological and biological agents (Le et al. 2003) which are often augmented by access to maternity. Both during pregnancy and in the post-partum, approximately 20-25% of the women reported elevated levels of depressive symptomatology, as assessed through self-report measures (O'Hara et al. 1984, Gotlib et al. 1989).

Even though it has been ascertained that depression during pregnancy is related to socio-demographic variables different from post-partum ones (Gotlib et al. 1989), thus suggesting the presence of different psychological or etiological factors, a number of research suggests that woman's psychological well-being before and during pregnancy is substantially related to maternal depression. First of all, antenatal depression has been found to be the strongest predictor of postpartum depression (Graff et al. 1991, O'Hara and Swain 1996); postpartum depression increases when various risk factors are present: lack of social support (O'Hara 1986), poor marital relationships (Campbell et al. 1992, O'Hara and Swain 1996), increased stressful life events during pregnancy and after delivery (O'Hara 1986, 1994). Moreover, prior negative pregnancy experiences, such as abortion or miscarriage, could have long-term impact on women mental health in that they increase psychological vulnerability in terms of poor self-esteem and helplessness (Bifulco et al. 1987, Bernazzani and Bifulco 2003).

One of the most controversial aspects on maternal depression concerns its assessment reliability. Incidentally the term "depression" has been variously used to refer not only to a continuum of depressive mood and psychological distress, but also for a definite diagnostic category (Campbell and Cohn 1991, O'Hara et al. 1990, Myers et al. 1984). Whereas the prevalence of the latter one is around 10%, when self-report questionnaires are used (such as Beck Depression Inventory (BDI) or CES-D) the percentage of women with depressive symptomatology is much higher (between

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20 and 30%): these women often show greatly incapacitating symptoms which don't meet DSM-IV criteria (O'Hara 1997). It is important to underline that individuals who demonstrate elevated levels of symptoms but do not meet interview-based diagnostic criteria, typically labelled "false positive", did not differ significantly from "true positive" on most of the measures of psychosocial dysfunction. Moreover, they are both characterized by elevated levels of psychopathology and a high risk of experiencing psychopathology in the future, particularly depression and anxiety (Gotlib et al. 1995). Research studies on maternal depression highlighted that dysfunctional affective, cognitive and interactive problems related to depression can be transmitted to children from earliest phases (Rutter 1990, Murray et al. 1993). In this area, various intergenerational transmission mechanisms have been hypothesized, but none of them has shown its utmost relevance in the long run. Some authors have focused on genetic transmission mechanisms which can predispose or pass on vulnerabilities directly to the child. These mechanisms would account for only a limited percentage of the psychological disorders variance in depressed women's children. There is some evidence that depressed mothers have abnormal neuroendocrine functioning during pregnancy that could lead the fetus to be exposed to increased levels of cortisol (Goodman and Gotlib 1999, Field et al. 2001). In other instances, temperamental and physiological characteristics present at birth in depressed mothers' children have been called upon (Zuckerman et al. 1990). Most researchers believe that both biological and psychosocial agents lead to the intergenerational transmission of depression, though the precise mechanisms of such transmission are not clear (Cicchetti and Toth 1998). However, more and more often maternal depression has been related to a number of environmental factors, such as parental difficulties, family conflict and violence, socio-economic distress, which can in turn contribute to make the caregiving functions of depressed mothers particularly dysfunctional.

Despite various definitions of maternal depression, there is a large agreement that depressive symptomatology may impact the quality of parenting and the development of the children of depressed mothers.

Effects of maternal depression on children

The importance of studying maternal depression resides mainly in the evidence shown by numerous research informing that children of depressed mothers are subject to 2 to 5 times higher psychopathological risk than normal parent children (Orvaschel et al. 1988, Weissman et al. 1984). Such risk comprises behavioral troubles, physical illnesses, insecure attachment, depressive symptoms and disorders (Weissman et al. 1984, Radke-Yarrow et al. 1985). Unipolar maternal depression, for instance, is linked to a jeopardised social, affective and cognitive development both in children and adolescents (Downey and Coyne 1990, Gelfand and Teti 1990, Murray 1992, Murray et al. 1996).

Effects of maternal depression on child development are yet quite heterogeneous and range from affective regulation disorders to difficulties in interacting with people and objects, from higher cognitive problems incidence to insecure attachments towards mothers (Teti et al. 1995, Tronick and Weinberg 1997). These conditions tend to persist also in older children who show a set of emotional, social and cognitive difficulties together with future psychiatric symptoms, among which depression is one (Downey and Coyne 1990, Hammen 2000).

Particularly mother-child relationship difficulties during post-partum depression seem to trigger a process which leads to less than optimal child development which has also been highlighted in a multiplicity of follow up studies carried out with different methods and instruments. These studies focused on effects of maternal depression from birth up to adolescence. Several research studies have shown that newborns of depressed mothers manifest a greater incidence of prematurity and very low birthweight (Singer et al. 1999), inferior performance on neurobehavioral assessments (Field 1998) and more disorganized sleep (Field 1998, Field et al. 2001). As far as the first year of life is concerned, various research found a hypotonic state in depressed mothers' babies, a decreased ability to calm themselves down together with a reduced social response, a reduction of positive facial expression and vocalization, a higher irritability and lower activity levels (Cohn and Tronick 1989, Field 1984, Murray 1992). It is hypothesized that such interactive and temperamental difficulties make these children at risk of dysfunctional interactions. These children also show a minor degree of involvement with people and things (Cohn and Tronick 1989), a greater detachment and minor attention to their mothers (Cohn and Tronick 1989; Field et al. 1985, 1988, 1990). They also spend a considerable amount of time looking in other directions or showing distress. Infant of depressed mothers may have lower frustration tolerance, tend to have more behavioral problems, such as sleeping and eating problems, temper tantrums, and separation difficulties (Cicchetti et al. 1998). The main effect of maternal depression on the child seems to be a heightened risk of physical and mental instability, pointing towards a postponed maturation in the stabilization of somatic and psychological self-regulation.

Problems in mother-child interaction

Maternal depression may also increase the likelihood that the child will form an insecure attachment that in turn may lead to a heightened risk of depressive symptomatology (Field 1989, Murray 1992, Teti et al. 1995). Maternal regulative failures involve an ample range of affective difficulties in children which influence their interaction and exploration abilities. Bowlby defines the basic social need as acquiring a "safe base", which is also a premise for the emergence of the second behavior system, i.e. exploration of the environment. Maternal depression may create insecurity to a degree where the exploration system is not activated. In older children cognitive deficits have been shown, reported also at 9 and 18 months during Piaget's object permanence test (Murray et al. 1993). In a prospective longitudinal study, 5 years old children, whose mothers suffered post-partum depression, showed clinically

significant levels of behavioral disorders, a depressed cognitive style and early cognitive deficit persistence (Murray et al. 1996). In another study, 11 years old children appeared to have significantly lower IQ scores and poorer school performance (Hay et al. 2001). Similar results have emerged from research which investigated vulnerability to depressive symptomatology in school age children. Also in this instance maternal depression symptomatology seemed to have a significative impact on children psychological well-being (Graham and Easterbrooks 2000). These children have an increased risk of developing a major depressive disorder as well as an anxiety disorder and alcohol dependency in adolescence (Weissman et al. 1997).

Interaction styles of depressed mothers

Although a variety of mechanisms have been hypothesized to account for the negative outcome observed in children of depressed mothers, there is wide agreement that the impact of maternal depression on infants is significantly mediated by the quality of parenting, that is maternal caregiving and emotional responsiveness (Campbell et al. 1995).

Depressed mothers have been described as exhibiting less happy and more dysphoric affect (Gelfand and Teti 1990, Radke-Yarrow et al. 1994). They tend to express fewer emotions and show more sad affect. Field et al. (1985) found that depressed mothers expressed more punitive, controlling attitudes toward child-rearing and felt less in control of their own lives. Moreover, depressed mothers seem to be unresponsive and unavailable and to show less imitative behaviors when interact with their infants (Field 1984, Cohn et al. 1990, Cohn and Tronick 1983). They have also been described as being understimulating or overstimulating and intrusive when interact with their infant (Campbell et al. 1995).

In spite of the great amount of research confirming maternal depression negative effects on child development, studies on the influence of maternal depressive symptomatology on mother-child interaction behavior describe each time partial and sometimes contradictory aspects. It is possible to think that the heterogeneity characterizing such studies is ascribable to the fact that negative maternal behavior, when depression is present, is exacerbated or on the contrary mitigated by particularly important risk and protective factors.

It is not only the intensity of depression to determine the mainly dysfunctional behavior of these mothers, but often the presence of correlated factors, such as comorbidity with other psychopathological symptoms, a relevant number of psychosocial stresses, the quality of mental representations of attachment.

Lyons-Ruth studies (1999) pointed out that the so called "relational model" must be taken into account next to the "threshold model" of maternal depression effects, according to which depression inevitably tends to influence many personal functioning areas among which parental abilities. According to the "relational model", depression is regarded as one of the possible aspects correlated to present or past family stresses, associated with negative maternal behavior. Family stress factors seem to be primary: they could mediate maternal intrusive and withdrawal behaviors independently of mother's depressive state as a stress response.

Data stemmed from Lyons-Ruth research (1999) seem to confirm the "relational" model, according to which caring behavior is learnt within early relationships with parents whereas depressive symptoms could be an additional factor, even though it may not be necessarily correlated to these early maladaptive models. Such conclusion places itself within the enough consolidated attachment research perspective which shows a very strong correlation between infantile attachment experiences and parental behavior towards children (van Ijzendoorn 1995). This conclusion must also be pointed out as a therapy solely aimed to cut down depressive symptomatology could not modify relational models and consequently maladaptive parental behaviors.

Finally this model could also help to clarify which aspects are crucial in influencing parental behavior of depressed mothers. Indeed many research studies state that "depressed" mothers cannot be regarded as a homogeneous group. Latest research showed that "depressed" mother group can present quite heterogeneous characteristics and affective and social interaction behavior styles that vary greatly from woman to woman (Cohn et al. 1986, Cohn and Tronick 1989, Field et al. 1990, Lyons-Ruth et al. 1986).

Starting from Cohn and Tronick research (1989), four different maternal affective behaviors in face-to-face interactions during first year have been observed. A first group is made up of intrusive mothers who interact with their child in an abrupt way, who speak to him/her in an angry tone of voice and actively interfere with child's activities. A second group is represented by disengaged/withdrawn mothers who seem to be little involved, unresponsive, dull as far as affects are concerned and unable to support children's activities. In the third group we can find "mixed" mothers who manifest a blend of intrusive and withdrawal behaviors. Finally, the last group, defined "positive" that even though it shows intense depressive symptoms still displays a behavior similar to the one manifested by the control group. Lack of contingent responsiveness, turn-taking or reciprocity was common to all but four mothers, though different interaction styles were observed.

Recent studies (Diego et al. 2002; Field et al. 2001, 2004) support the findings according to which maternal interaction styles modulate the effects of maternal depression on infant behavior and physiology during interactions. The type of interaction style exhibited by mothers with depressive symptoms appears to be a marker for behavioral and physiological characteristics in their infants (Field et al. 2004). These mothers do not only have different interaction styles with their infants, but have different physiological and biochemical profiles that were partially mirrored by their infants (Field et al. 2001). Withdrawn depressed mothers and their infants showed greater relative right frontal EEG activation patterns and intrusive depressed mothers and infants showed relative left frontal EEG activation. Moreover, infants of withdrawn depressed mothers have lower dopamine levels than infants of intrusive depressed mothers (Lundy et al. 1999, Field et al. 2001). Lower dopamine levels could in part explain both the mothers' withdrawn behavior style as well as the infe-

rior performance of their infant, that showed less exploratory behavior and had lower Bayley mental scale scores at 12 months (Hart et al. 1999). On the other hand, infants of intrusive depressed mothers showed a significant increase in salivary cortisol levels, following the interaction, which suggests that these infants may have been more stressed by the interaction (Diego et al. 2002).

However, in some studies (Jones et al. 2001, Field et al. 2003), a percentage of depressed mothers ranging from 20 to 25% showed a positive behavior so that these mothers were defined "good interaction" partners. Even though these mothers differentiated themselves from the control groups, they still manifested neurophysiological profiles similar to the ones of withdrawn and intrusive mothers, with elevated cortisol, norepinephrine and epinephrine during pregnancy. However, infants of "good interaction" mothers did not show high amount of indeterminate sleep and received better scores on the Brazelton scale. These newborns were less dysregulated: this may have contributed to their mothers being "good interaction" partners or displaying behaviors that look more like those of non-depressed mothers (Field et al. 2003).

It seems that the severity of the effect of depression depends on three variables: the severity of the depression itself, the enforcing effect of co-morbidity, and the ability of the mother to be active and behave normally towards the child in spite of her depressed state.

Process of mutual regulation

Research hypothesizes that, among the several factors which are associated to maternal depression effects on child development, process of affect regulation represents a critical area in depressed mothers' children (Tronick and Weinberg 1997).

According to this hypothesis, a chronic failure in mutual regulation sets in so that the child unconsciously puts strategies into effect which jeopardize his/her development. The affective disturbance observed in infants of depressed mothers is not the result of mirroring or imitation, or of the mother somehow "feeding" her affect to her infant. Rather, it is the result of the infant's normal regulatory capacities becoming increasingly narrowly deployed in a self-regulatory fashion in the face of the mother's failure to play her normal external regulatory role (Tronick and Gianino 1986).

It is well known that, within early regulation process, interactions between mother and child are characterized by shared positive affects, reciprocity, synchrony and tuning (Beebe et al. 1982, Stern 1985). The process of affect regulation is the optimal result between the child's biological predispositions and the caring relationship characteristics. It sees in action at the same time the baby's self-regulation and interactive behavior and the mother's ability to interpret child's signals and respond appropriately to them. In order to face the changes of his/her emotional state, the infant can use a series of behaviors whose function is to regulate his/her emotional state thus reducing his/her engagement with the external world, that is lessening his/her perceptive receptivity for instance by withdrawal or avoidance and replacing this with self-stimulating and self-comforting behaviors, such as sucking his/her thumb, touching his/her face or swinging.

At the beginning, these self-regulation abilities are immature and limited: the baby needs some additional regulation abilities which are given to him/her by the mother who interprets the infant's self-regulation behaviors and respond appropriately to them, making this task easier so that the baby is allowed to self-regulate (Tronick and Weinberg 1997).

At the same time, the baby is able to use regulation behaviors directed to others, such as the smile to signal his mother to keep an interaction going or crying to stop an inappropriate behavior whose ultimate aim is to reach a shared positive emotional state. Whenever the mother responds appropriately to these regulative expressions of the baby, he/she is able to keep up both a self-regulation and an interaction regulation so that positive emotions come into being. Baby's regulation system is mainly a dyadic one depending both on baby and mother.

A critical event in order to understand reciprocal regulation is the rupture and reparation process. During normal mother-child interactions a number of miscoordinated moments can be observed, that is moments in which one of the two partners doesn't properly grasp the meaning of the other's emotional espression and thus he/she doesn't react in a suitable way. Research studies (Tronick and Gianino 1986, Tronick and Cohn 1989) on this subject point out that for nearly 65% of the time the interaction is not properly coordinated, but almost half of these interaction mistakes are made up immediately afterwards. Mis-coordinated states can represent positive events from a developmental point of view as they allow the baby to elaborate his/her regulation abilities and to become more able to make use of them; moreover to the extent that the following reparation experience becomes a coherent and regular feature of the interaction experience, the baby will develop a generally well regulated and reparable representation of his/her interaction with the mother.

These hypoteses have been confirmed by observations carried out during Still Face paradigm when children who had had a greater interaction reparation experience more frequently and insistently signaled their mothers their state of unease, whereas those who had had a poor reparative experience turned round and became stressed and sad more easily (Cohn and Tronick 1983, Tronick 1989).

Instead during a depressed mother and child interaction a failure in the process of reciprocal interaction takes place which implies that the baby continuously experiences negative emotions and a sense of lack of connection with others.

In the attempt to face negative affects, the baby develops a negative affective core, mainly characterised by rage and sadness, a defensive style, lack of trust in the caregiver. Moreover, by virtue of his/her own adaptive abilities, the baby will be able to structure internal relational models which involve an excess or deficiency in his/her self-regulation ability: thus self-regulation skills can have a defensive function as to the excess or deficiency of a suitable mutual regulation.

Studying in a more detailed way the different depressive categories, Cohn and Tronick (1989) high-

lighted that intrusive mothers' children spend around 70% of their time looking another way as to where their mothers are looking. Intrusive mothers interfere negatively with their children's activities and the interactive reparation doesn't take place on an ongoing basis. Children initially experience rage, don't look at their mothers and send her away, thus developing an affective core in which rage is in the foreground. Instead as far as more withdrawn mothers are concerned, children tend to protest more and are also more stressed. They are also not able to keep up a social tie as their mother is not able to respond in a suitable way and the dyad is unable to make up for interactive setbacks. Given the impossibility to modify maternal behavior, these children often develop self-directed behaviors, characterised by self-comfort, self-regulation, passivity, and isolation. After repeated failures to positively engage their mothers, these infants may withdraw and use less mature, self-directed regulatory strategies to cope with negative emotions (Tronick and Gianino 1986).

The development of early self-regulation is apparently very dependent on the previous creation of a mutual regulation system between mother and child. Maternal depression seems to invalidate the development of this previous system, and instead the baby's self-regulation is based on rage, sadness and isolation.

Preventive intervention for maternal depression

Since many studies highlighted that mother-child interaction represents one of the key elements through which the transmission of maternal depression and the ample range of psychopathological effects on child can be understood, it seems relevant to take into account an area related to early preventive intervention, the home visiting programs, which has developed in the last years in order to reduce the effects of risk on child development.

Presently, specialized community health services aimed at specific needs of mothers with post-partum depression are rare, therefore offering them focused interventions and testing their clinical efficacy is a very complicated task.

In addition, research reports that postpartum period women are reluctant to look for psychiatric treatment autonomously (Kumar and Robson 1984). This reluctance could depend on several possible factors, first of all the lack of information about depression signs and symptoms, which increases mothers difficulty in recognising and acknowledging their negative emotions in the post-partum period.

According to these evidences, home-visiting can be considered a valid means of prevention, aimed at reducing psychopathological risk in infants. Home-visitors call at the depressed mothers' homes in order to encourage a change in their attitudes, knowledge, and behaviors, so that an adequate interaction with the infants is promoted. It can be argued that the home visiting foremost aim is not curing or improving maternal depression, rather limiting its pathogenic effects on infants' development, by improving maternal skills within dyadic interactive exchanges.

Beyond this common purpose, home-based interventions differ in their specific schedules for a multiplicity of factors, related to procedural aspects and to several environmental contexts in which mothers and infants live.

Here, we present a home-visiting detailed review which includes the description of the several types of intervention, their specific aims and the results of experimental research studies, in order to report the complexity of these programs, within the field of maternal depression.

Home visiting interventions

Home visiting has been promoted by the American Academy of Paediatrics as an important complement to office-based practice (American Academy of Paediatrics 1998). It has been shown that home visiting interventions are able to improve pregnancy outcomes and to reduce the child abuse and neglect rates in high-risk families, as in the case of maternal depressive risk conditions (Olds et al. 1999).

Home-visitations are largely used to provide direct services to depressed women and their infants, addressing their needs and supporting their relational experiences during the challenging post-partum period (Gomby et al. 1999, Heinicke et al. 1999, Paris and Dubus, 2005, Taggart et al. 2000).

Such interventions are seen effective as they offer the service directly to depressed mothers. They also allow the home-visitors to observe mothers and their infants in several naturalistic interactive situations, examining the real environment in which they live (Gomby et al. 1999, Olds et al. 1999). By meeting mother-infant dyads in their own homes, the home-visitors are facilitated in assessing their needs, difficulties and protective factors, with the purpose of structuring the most appropriate intervention. Furthermore, home-visitors' inclusion within the domestic environment creates a trusting relationship with the mothers, which, at the same time, removes them from social isolation and from lack of confident contacts (Paris and Dubus 2005).

Many home-visiting interventions are performed by professional services, such as trained professional nurses, psychologists, social workers, or counsellors; in other cases, programs include paraprofessional operators, such as well-being mothers (Lyons-Ruth et al. 1990) or volunteers.

Home-visiting aims

Home-visiting is based on a *transactional intervention model*, which takes into account all the interrelated factors which contribute to the quality of mother-infant interaction, such as mother's mental health condition, child's developmental characteristics, together with the quality of their life environment, in terms of presence of psychosocial risk factors or of social support ones (Belsky 1984, van Bakel and Riksen-Walraven 2002).

In the field of maternal depression, the home-visiting program is designed to provide an accepting and trustworthy relationship with the mother, in order to: enhance more reciprocal and appropriate interactions

with the infant; improve parental adoption of health promoting behaviors; encourage positive caregiving practices, by underlining mother's role as a source of her infant's emotional security; reduce parental stress; improve maternal mood; decrease social isolation from other mothers, in order to facilitate a social experience of exchange; increase mother's ability in utilizing community agencies or neighbourhood support systems, to meet various needs, such as social, financial, legal, health, or educational ones (van Doesum et al. 2005, Lyons-Ruth et al. 1990).

The trustworthy relationship between home-visitor and the mother is an important predictor of treatment outcomes (Heinicke et al. 1999, Lieberman and Pawl 1993, Slade 2002). Home-visitor's attention is both focused on maternal emotional and social aspects and on child functioning, in order to promote reciprocal dyadic interactions. By focussing the attention on the dyadic relationship, the home visitor reinforces mother's ability to keep her own needs in mind and enables her to be responsive to the multiple needs and experiences of her child (Slade 2002).

Home-visiting goal is empowering depressed mothers in their parenting role, by showing empathic and not judgmental attitudes. The effectiveness of such interventions has been moreover confirmed by mothers' reports, in which they relate the sensation of benefit gained from home visitor's emotional support (Gomby et al. 1999, Heinicke et al. 1999).

According to this "emotional attunement-based approach", some home-visiting interventions are based on the theory of *relational empowerment* (Surrey 1991), which underlines the importance of the "…capacity to be responsive and 'moved' by the thoughts, perception and feeling states of the other person." Being 'heard' empowers depressed mothers to feel "…enlarged, able to see more clearly and energized to move into action" (p.176-168).

This approach defines the basic purpose of some home-visiting programs, characterized by "listening-based interventions" (Clement 1995, Culliman 1991, Gerrard et al. 1993). A study has revealed the ability of a structured "listening home-visiting intervention", directed to women with post-partum depression, to cut down the number of mothers still depressed at six months from 62% to 31%. (Holden et al. 1989). Furthermore, research has confirmed the possibility of such programs to enhance the emotional well-being of women during the post-partum period (Culliman 1991, Gerrard et al. 1993).

According to these findings, it has been supposed that "listening intervention" during pregnancy, offered to women with depressive symptoms, may have similar effects (Clement 1995): it could be argued that the extent of these supporting programs should grant the continuity of mothers' well-being from pregnancy to the post-partum period.

Early Home-Visiting interventions

The empirical evidence of the relation between maternal depression and child development (Boyd and Weissman 1981, Dodge 1990, Downey and Coyne 1990, Field et al. 1985, Gelfand and Teti 1990, Radke-Yarrow et al. 1985, Rutter 1966, Rutter and Quinton 1984, Trad 1986, Weissman et al. 1984, Zahn-Waxler et al. 1984) suggests that preventive home-visiting interventions should take place not only at an early stage, including children in the age range of 0 to 12 months (Murray and Cooper 1997), but also during pregnancy.

Many of the factors which are strongly associated with post-partum depression - high levels of relational conflict, marital dissatisfaction, lack of confiding relationships, lack of adequate social support, disadvantaged socioeconomic background, stressful life events, and previous psychiatric history (Battle and Zlotnick 2005, O'Hara and Zekoski 1988, Romito 1989) - are already present during pregnancy. Some empirical research studies have found a relative stability of depressive symptoms from pregnancy to post-partum period (Hayworth et al. 1980, Manly et al. 1982). Other studies have likewise hypothesised that depressive symptomatology during pregnancy could be the major predictor of post-partum depression (O'Hara et al. 1984, 1991; Green 1990; Graff et al. 1991; O'Hara e Swain, 1996).

Home-visiting interventions during pregnancy seem to have beneficial effects on several woman depressive risk factors, such as dysphoric mood, low self-esteem, nervousness and worry about post-partum period, low perceived self-efficacy and lack of social involvement (Elbourne et al. 1989).

It is unclear at which moment of the pregnancy it would be most effective to screen women for their inclusion within the home-visiting programs. Some studies have noticed that women who develop depression in the third trimester are more likely to continue being depressed during post-partum period than those who are depressed in the first trimester of pregnancy (Oates 1989). According to these findings, screening should take place in the early part of the third trimester, even though other studies have suggested that it would be better for the preventive home-visiting programs to begin in the earliest period of pregnancy (Elliott 1989).

Efficacy of home-visiting

In many studies, home visiting interventions have been evaluated for their various outcomes, including effectiveness in enhancing parent knowledge; mothers' attitudes and behavior regarding childrearing; effects on mothers' view of themselves as parents; prevention of child abuse and neglect; effects on family function; relation with infant development; effects on maternal depression and mood; relation with the quality of maternal self-esteem; effects on the quality of mother-infant attachment (Ahn and Kim 2004; Armstrong et al. 1999, 2000; Chabrol et al. 2002; Gomby et al. 1999; Lyons-Ruth et al. 1986, 1987, 1990; Morrell et al. 2000; Navaie-Waliser et al. 2000; Olds et al. 1999). Most of these programs had curricula which educate the mothers on various aspects of caregiving, enhancing them in achieving parenting knowledge about child development, eventually encouraging the connection with the social environment, by providing referrals to local support agencies.

These researches make use of rigorous experimental designs, in which depressed mothers-infant dyads

are randomly assigned to the treatment (receiving home-visitation) or to control condition (receiving other or no service). Evaluators employed many techniques to assess the effectiveness of home-visiting, including standardized questionnaires (Ahn and Kim 2004; Ammaniti et al. 2006; Armstrong et al. 1999, 2000; Fraser et al. 2000; Horowitz et al. 2001; Lyons-Ruth et al. 1990; Morrell et al. 2000); observational coding system for mother-infant naturalistic interactions (Ammaniti et al. 2006; Armstrong et al. 1999, 2000; Fraser et al. 2000; Horowitz et al. 2001; Lyons-Ruth et al. 1990); laboratory experimental procedures (Ammaniti et al. 2006; Armstrong et al. 1999, 2000; Lyons-Ruth et al. 1990); mothers' semi-structured interviews, which analyze their own behaviors or attitudes, as well as their infants' ones (Ammaniti et al. 2006, Armstrong et al. 1999, Paris and Dubus 2005).

Home-visiting widely varies in terms of intervention onset (during pregnancy rather than post-partum period); frequency of the visits (schedules range from weekly to monthly); program duration; the operators who administer the intervention (professional workers *versus* paraprofessional ones); the well-matched approach (*ad hoc* structured intervention, in accordance to the multiplicity of the characteristics of the depressed mother-infant dyads, and in relation to both risk factors and protective situations).

Literature reports various interesting studies carried out in the home-visiting area applied to depressed mother-infant dyads, even though the findings appear often discordant: this particular aspect could be related to the intrinsic variety of this population, as well as to the different interventions themselves.

Various empirical researches have demonstrated that home-visiting programs can enhance maternal self-esteem and decrease levels of post-partum depression, by facilitating mothers' mood adjustment and their parental competencies.

Armstrong and colleagues (1999) found that, at six weeks, mothers who were receiving the home-visiting program had significant reductions in levels of postpartum depression, as well as improvements in their experience of the parental role and enhancement in the ability to maintain their own identity. Compared with women who did not receive home-visiting interventions, these mothers had more reciprocal and positive dyadic interactions, with significantly higher scores in the aspects of the home environment which in turn were related to optimal development in children. Furthermore, authors found that intervention group mothers were significantly more satisfied with the community child health service.

Egeland and Erickson (1993) reported a follow-up evaluation, at infant age of 19 months, of a precedent home-visiting program (Egeland and Erickson 1990). The authors found that home-visiting intervention decreased levels of mothers' depressive symptoms and anxiety, enhancing at the same time their competencies in managing daily commitments. Compared with the women of the control group, these mothers were also more able to provide their infants with a stimulating and organized home environment, reaching higher scores on the HOME scales (Home Observation for Measurement of the Environment Inventory, Caldwell and Bradley 1984). As regards the percentage of children with secure attachment in the intervention and non-intervention groups, no difference has been revealed.

Ahn and Kim (2004) investigated the effects of a home-visiting discharge education program on maternal self-esteem, mother-infant attachment, postpartum depression and family function in mothers of neonatal intensive care unit (NICU) infants. The authors found a significant decrease in postpartum depression, an increase in maternal self-esteem and an enhancement of mother-infant secure attachment. No changes in these variables have been reported in control group, before and after the routine hospital-based discharge education.

Also Long and colleagues (2001) reported a decrease in the levels of depression and anxiety, in mothers who received home-visiting intervention, with an improvement in their psychological well-being. Women who attended the home-visiting programs were more able to have positive interactions with their children.

Navaie-Waliser and colleagues (2000) reported a research aimed to determine whether home-visiting program was associated with improvements in the mothers' psychological functioning one year after delivery, and whether these enhancements were associated with the type and intensity of support provided by home-visitors. Authors found that more intensive home-visiting support decreased levels of depression in mothers, who referred an increase in self-esteem. Mothers who received less intensive home-visiting interventions, did not differ significantly from non-participants in their self-esteem or depression levels. No significant differences were observed in the perceived stress levels of participants as compared with non-participants, regardless of the intensity of home visitor support. Moreover, it has been found that mothers' psychological functioning is influenced by the intensity of the support provided by the home-visitors, rather than by the different specific types of support (emotional, instrumental or informational one).

Chabrol and colleagues (2002) evaluated the efficacy of a cognitive-behavioral program of between five and eight weekly home-visits on prevention and treatment for postpartum depression. Authors reported that women who received home-visiting interventions had significant reductions in the frequency of probable depression, compared with those who did not have any preventive support program.

Other researches haven't found the same benefits on maternal depression, which maintained the same status, with a minimum, and thus no relevant, change over time. In any case, these studies have revealed that home-visiting can enhance maternal role adaptation and competencies with parenting, stimulating mothers' adoption of health promoting behaviors.

Heinicke and colleagues (1999) found that at six months mothers' responsiveness to their children' needs were similar in intervention and non-intervention groups. Significant differences between home-visited mothers and unserved ones emerged by 12 months, with an increase of mothers' responsiveness and an improvement of secure attachment of their infants. In the field of free-play interactions, mothers who received home-visiting interventions expressed more positive affect towards their children by 12 months, progressively en-

couraging their autonomy more. At 12 months, mothers who did not receive the home-visiting interventions exhibited more restrictive, punitive and interfering behaviors towards their children. At this age, authors reported no significant differences in the levels of depression and anxiety between the intervention and non-intervention group

Armstrong and colleagues (2000) found that home-visiting intervention improved maternal functioning at 4 months. All aspects of the home environment, including the quality of mother-infant interactions, were significantly enhanced. In particular, mothers who received home-visiting programs reported fewer restrictions imposed by the parenting role; greater sense of competence in parenting; greater emotional availability; major acceptance of their infants' behaviors; greater capacity in organizing the home environment according to their infants' safety and development. Early differences in maternal depression were not maintained at 4 months. Authors reported an increase in mothers' adoption of health promoting behaviors, such as not smoking in the house or around the infant.

Lyons-Ruth and colleagues (1990) compared 18 months old home-visited infants with 2 groups of socioeconomically similar unserved infants on parameters of infant development, infant attachment, mother-infant interaction, maternal depression, and maternal social contacts. Home-visited infants of depressed mothers outperformed unserved infants of depressed mothers by an average of 10 points on the Bayley Mental Scale and were twice as likely to have a secure attachment in the Strange Situation (Ainsworth et al. 1978), with unserved high-risk infants showing a high rate of insecure-disorganized attachment models. Duration of services was positively correlated with maternal involvement at 12 months. Home-visiting interventions did not produce any benefits on maternal depression which present no consistent change over time.

Other researches did not report such encouraging findings towards the promotion of home-visiting interventions with depressive risk motherhood.

Horowitz and colleagues (2001) tested a home-visiting program to promote responsiveness between mothers experiencing postpartum depressive symptoms and their infants. Authors found no effect of the intervention on levels of depression, which decreased also in control group, and in maternal responsiveness, which increased in the both conditions over time.

Morrell and colleagues (2000) established the relative cost effectiveness of postnatal support in the community in addition to the usual care provided by community midwives. Authors found no health benefit of additional home-visiting interventions by community postnatal support workers compared with traditional community midwifery visiting.

Unlike other occidental countries, such as USA or Great Britain, in Italy home-visiting interventions specifically directed to intervene in depressive risk motherhood are very rare. Regarding this evidence, we want to report an Italian experience of home-visiting study whose purpose was to analyse the efficacy of early home visiting intervention in promoting the mother-infant interaction, both in psychosocial risk and depressive risk mother-infant dyads (Ammaniti et al. 2006).

In this research, mothers were contacted by maternity and child health services, when they were in the second trimester of pregnancy (5^{th}-6^{th} month). Mothers were interviewed on psychosocial risk factors (such as low educational level, low socioeconomic status, single motherhood, family psychiatric history, history of physical or sexual abuse, antisocial behavior, life events such as loss, separation, abortion, number of children, absence of social support) and also completed a questionnaire on depressive symptoms (CES-D, Radloff 1977).

Three groups of women were selected on the basis of the psychosocial risk interview and CES-D's data:

- depressive risk group: one or no psychosocial risk variable and high scores on depressive symptoms (CES-D $\geq$ 20, Psychosocial risk variable $\leq$ 0-1);
- psychosocial risk group: three or more psychosocial risk variables and low scores on depressive symptoms (CES-D $\leq$ 10, Psychosocial risk variable $\geq$ 3);
- low risk group: one or no psychosocial risk variable and low scores on depressive symptoms (CES-D $\leq$ 10, Psycosocial risk variable $\leq$ 0-1).

Each group was randomly split into two subgroups: an experimental group who received a home-visiting program and a control group who received scheduled visits for data collection purposes only. None of the mothers in the study were receiving treatment for depression or any other mental health problem.

The Home Visiting Program, from pregnancy until the baby's first year of life with a weekly schedule, was based on the widespread experience of home visiting, which is designed to promote child development, improve parenting practices and facilitate positive parent-child relationship. The parents are encouraged to improve their competence and sensitivity towards their child, to observe their interactions with the baby and to realise the importance of their influence on the child's development. The home visiting intervention was set up by professionals such as psychologists and social workers, who were appositely trained and supervised on their work during the intervention. The aims of home visiting were directed to enhance the mother's capacity to read and interpret the signals and the behaviors of the child. The strategy of intervention had the aim to stimulate the mother-infant interaction facilitating mother's personal potentiality and to avoid any direct advice. The intervention was theoretically based on the attachment theory which can represent a valid means, in order to read the interactions especially during critical exchanges.

The quality of the dyadic exchanges has been assessed during the observation of mother-infant interactive sessions at 3^{rd}, 6^{th} and 12^{th} month, using an observational code system with sensitivity, interference, affective state of the mother, cooperation, and infant self-regulation ratings (Speranza et al. 2003). Furthermore, in order to assess depression chronicity during the first year, mothers' depressive conditions were assessed at several different moments: 1^{st}, 3^{rd}, 6^{th} and 12^{th} month.

We report the results of depressive risk condition.

The findings have demonstrated the ability of the home-visiting to improve depressed mothers' sensitive behaviors towards their infants, already after six months of intervention.

A more positive mothers' responsiveness towards their infants' signals was observed in increased sensitivity behaviors and more cooperative interactions as well as in decreased interfering behaviors and negative affective states.

Although home-visiting intervention hasn't modified maternal depressive symptomatology, findings report that mothers tended to respond to their infant's signals appropriately, being able to scaffold more reciprocal and cooperative exchanges. In this study the beneficial effects of home-visiting on depressed mother-infant interaction tended to last up to 12 months with the increasing of maternal sensitivity, cooperative interactions and positive affective states.

Home-visiting interventions: critics and future perspectives

According to empirical research findings, it can be argued that home-visiting interventions are important components of early prevention.

This practice improves depressed mother's relational competencies, promoting mother-infant interactions and bringing benefits for the healthy development of infants, otherwise at risk of several psychopathological outcomes (Boyd and Weissman 1981, Dodge 1990, Downey and Coyne 1990, Field et al. 1985, Gelfand and Teti 1990, Radke-Yarrow et al. 1985, Rutter and Quinton 1984, Trad 1986, Weissman et al. 1984, Zahn-Waxler et al. 1984).

The procedural variety of home-visiting interventions suggests the necessity of further systematic studies, to test program effects over time and to structure more rigorous long-term evaluations. The frequent discordance of research findings gives evidence of the home-based practice complexity, related to the intrinsic variety of depressed mothers' population, as well as to the different approaches of interventions themselves.

The identification of more standardized intervention strategies could support home-visitors' training and work, by suggesting better recognisable procedural rules.

In addition, an increased attention paid to the technical aspects of home-visiting practices could promote a better integration of these services with those provided by primary health-care professionals in the postpartum period.

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